December 1991 90-280-12

54

REMEDIAL ACTION PLAN
SAFETY-KLEEN CORPORATION
CHICAGO RECYCLE CENTER

? SWI-A-2 USEPA

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REMEDIAL ACTION PLAN
SAFETY-KLEEN CORPORATION
CHICAGO RECYCLE CENTER

1.0 INTRODUCTION

This Remedial Action Plan (RAP) for soil has been developed to comply with Special Condition No. 20 of the Illinois Environmental Protection Agency's (IEPA's) closure plan modification approval dated August 30, 1991. The RAP was required as part of the Resource, Conservation, and Recovery Act (RCRA) closure process to address degraded soil related to the closure of the former aboveground storage tanks T-190 through T-193.

Closure activities performed to date have been performed in accordance with the approved partial closure plan dated May 1990 and have been summarized in the Closure Progress Report dated November 1991. This RAP is being submitted concurrently with three other documents required in the IEPA's August 30, 1991 letter. They are the Supplemental Investigation Report, Ground Water Sampling and Analysis Plan, and Ground Water Quality Assessment Program.

The Safety-Kleen Corporation (Safety-Kleen) Facility, located at 1445 42nd Street, is a solvent recovery facility that accepts solvent waste from Safety-Kleen toll customers and other industrial and commercial facilities. The center processes this waste material to recover clean material for recycle or sale. It is located in a primarily industrialized area with private residences located to the west and south of the site. The western perimeter of the site is bounded by the Ashland Cold Storage warehouse. Vacant properties lie to the north and east of the site. The southern boundary is formed by 43rd Street.

2.0 REMEDIAL ACTION PLAN APPROACH

Safety-Kleen has reviewed all available information collected to date related to the closure of Tanks T-190 through T-193. The available data indicates a number of important issues that have dictated the remedial approach.

First, the Chicago Recycle Center is underlain by a shallow water table approximately three feet below ground surface; in some cases less. Second, each of the former tank areas are surrounded by concrete containment dike walls. The footings of these dike walls are set approximately three feet below ground surface and rest upon relatively low permeability silt/clay soil. These areas are essentially acting as containment cells that are greatly retarding chemical migration from the closure units. The available data clearly indicate that the majority of the subsurface degradation is contained within these cells. Last, the available data indicate to some degree that the subsurface impacts may be related to sources other than the closure units. The Chicago Recycle Center is located in an old industrialized area. In fact, the site used to be part of the old Chicago stockyards.

The soil remediation plan presented herein has been designed to take the above-mentioned factors into consideration. In general, the remedial approach is as follows. Safety-Kleen, through an environmental consulting firm, plans to design, construct, and operate an on-site soil treatment system to remediate approximately 200 cubic yards of soil degraded with organic chemicals from within the closure unit areas. It is planned to utilize an on-site aboveground soil vapor extraction system to perform the necessary remediation. Bioremediation techniques may also be employed, if necessary, to enhance remediation efficiency. The goal of this program is to reduce the amount of the organic compounds in the soil at the source to a level that is no longer hazardous. The soil can then be either returned to the containment cells or disposed of off-site as nonhazardous waste. Safety-Kleen understands that the IEPA will be setting cleanup objectives for soil and ground water related to the closure Units T-190 through T-193 based on the information submitted in the Supplemental Investigation Report. Safety-Kleen plans to remediate the impacted soil to the extent necessary to protect human health and the environment.

This approach was developed because it was considered important to remediate the soil source within each of the containment cells since the majority of the chemical impacts are contained within these areas. It was not considered feasible to conduct soil remediation beyond the containment cells due to the shallow ground water at the site and interferences to facility operations (much of the surrounding area has been concreted). It is also believed that the soil beyond the containment cells is not acting as a source of ground water degradation. Further, it is not clear that soil impacts beyond the containment cells are related to the closure units. Safety-Kleen strongly believes that the remedial approach should be designed only for soil degradation related to Tanks T-190 through T-193. The following sections describe the remediation approach in detail.

3.0 VACUUM EXTRACTION TECHNOLOGY

Soil vapor extraction is a well-known soil remediation technique. The vacuum extraction process for removing volatile organic compounds (VOCs) from soil is essentially a batch air-stripping operation. Ambient air, which is free of VOCs, is drawn through the soil by a mechanically induced vacuum. As the air passes through the soil, VOCs transfer from the soil to the air stream. The air is pulled through by an air extraction network consisting of slotted polyvinyl chloride (PVC) well screen. The air extraction network rests on top of a diked impermeable liner which will serve as a containment area for the soils during treatment. The soil will be placed within the contained area and within the air extraction network. This area will then be enclosed by a temporary structure that will both shield the area from precipitation and retain internal heat.

3.1 Ex-situ Soil Vapor Extraction System

An aboveground or ex-situ soil vapor extraction system (SVES) is proposed to remove volatile organic compounds (VOCs) from the impacted soils. The aboveground SVES was chosen for the following reasons:

1. Further releases of compounds to the ground water are eliminated since the source soil has been removed.

2. Excavating and placing impacted soil into the aboveground SVES increases the pore volume of the soil, thus resulting in greater air contact with impacted soil and decreasing the time required for remediation.

3. VOC-impacted soil will rid itself of VOCs due to the natural vaporization process. Subjecting the impacted soil to the ex-situ SVES will substantially reduce the time required for remediation.

An ex-situ SVES process schematic is given on Figure 1.

3.2 Permit Requirements

Safety-Kleen will work with the IEPA's Air Quality Division to obtain an air discharge permit for the treatment system prior to start-up. In addition, local permit requirements will be evaluated and obtained as necessary.

4.0 SITE PREPARATION

Upon mobilization to the site, several items must be constructed as part of the site preparation work prior to commencement of remedial activities. This includes construction of the impermeable liner, construction of the protective overhead cover, construction of the air extraction network, and installation of the vacuum blower.

4.1 Impermeable Liner

A diked impermeable liner will be constructed to serve as a working platform for the treatment process. The treatment cell will be located in the southwest corner of the Chicago Recycle Center as shown on Figure 2. Figure 3 shows the layout of the treatment cell/containment area. The dimensions of the pad will be 60 feet by 60 feet. The earthen dike walls will extend up approximately three feet around almost the entire perimeter of the pad. An impermeable liner comprised of 60-mil high-density polyethylene (HDPE) will be laid over the earthen containment area. In addition, a ramp will be incorporated into the pad. The purpose of the ramp is to provide storage space for equipment needed during the treatment process. The ramp will slope towards the soil treatment area at a grade of 7.5 percent. Figure 4 shows a profile of the ramp and pad area. The purpose of the pad, ramp, and lip is to provide containment of the soils during the treatment process.

4.2 Protective Overhead Cover

A temporary structure will be placed over the top of the concrete pad. This temporary structure will consist of plastic sheeting supported above the soil, resembling a tent. The walls will be vented to provide adequate inside ventilation. This structure will shield the soil from precipitation while the treatment process is underway.

4.3 Air Extraction Network

An air extraction network will be constructed prior to the placement of the soil. While in operation, the air will flow down through the soil and into the air extraction network. The layout of the extraction network is illustrated on Figure 3. Slotted PVC Schedule 40 well screen will be used for the extraction lines which collect the air drawn through the soil. Once collected, the air will then flow out of the containment area into the atmosphere.

4.4 Vacuum Blower

A vacuum blower will be installed to provide enough negative pressure to pull the air through the soil and the extraction network and out into the atmosphere. The blower will be driven by an electric motor powerful enough to meet the flow requirements.

5.0 SOIL TREATMENT

5.1 Soil Removal and Placement

Once the vacuum extraction system is in place, soil treatment will begin. The soil within each containment cell (Tank Areas T-190 through T-193) will be excavated down to the water table using a backhoe. Approximately 200 cubic yards is projected for initial treatment. The backhoe will place the soil into the vacuum extraction treatment unit. After all of the soils that are to be treated are excavated, the backhoe and the dump truck will be decontaminated by water washing inside the treatment facility. The void resulting from the excavation will be covered with an impermeable liner to await the return of the decontaminated soil.

Soils to be treated will be spread throughout the entire treatment facility, excluding the ramp area. Soils will be mounded, in areas where the air extraction network is present underneath, to a maximum height of 2.5 feet. The remaining soil will then be spread evenly throughout the remaining areas.

5.2 Temperature Control

Vacuum extraction is a process very dependent on temperature. In general, the process becomes more efficient at higher temperatures. Therefore, it is important to keep the temperature inside the treatment facility as high as possible, while still maintaining workable conditions. If the treatment occurs in the colder months of the year, heaters may be necessary.

5.3 Soil Cohesiveness

The soil which will be treated is classified as a silty clay. Because of this, it is anticipated that the soil particles will adhere to each other and form lumps. To cleanse all the soil particles, it is necessary to break up these lumps of soil. To do this, a rototilling device will run through the soil periodically in order to keep the soil particles separated.

5.4 Biological Treatment

At some point during the remediation program, it may be beneficial to employ biological treatment techniques to enhance remediation efficiency, especially on the semivolatile compounds, if present. The exact bioremediation approach will be based on site-specific field data. Safety-Kleen will work with the IEPA to keep the agency aware of modifications to the remediation system.

5.5 Disposition of Clean Soil

After the soil inside the treatment facility has been remediated to the agreed-upon cleanup objectives, it will be returned to former tank areas or disposed of as nonhazardous waste at an appropriate landfill.

6.0 MONITORING PROGRAM

Throughout the treatment period, the effectiveness of the process will be monitored at regular intervals. The results of this monitoring program will be used to determine when the soils have been remediated to the applicable cleanup levels.

Monitoring will be achieved by collecting random samples from throughout the soil within the treatment cell. A total of 10 locations will be sampled and composited to one analytical sample for analysis. Equal aliquots of soil obtained with decontaminated stainless-steel sampling equipment will be placed in a mixing bowl. A representative sample will be withdrawn from this bowl and submitted for analysis.

6.1 Chemical Analyses

Chemical analysis will be performed by a qualified laboratory for the EPA Method 8240 and 8270 target compounds. These compounds are listed in the Supplemental Investigation Report and in the August 30, 1991 modified closure approval letter. They are repeated here for completeness.

Method 8240 Volatile Organic Compounds	Method 8270 Semivolatile Organic Compounds
Methylene Chloride	N,N-Dimethylacetamide
1,1,1-Trichloroethane	Pyridine
Tetrachloroethene	B-Picoline
Trichlorotrifluoroethane	1-Methyl-2-Pyrrolidinone
Acetone	
Trichloroethene	
Toluene	
Tetrahydrofuran	

Safety-Kleen will work with IEPA to develop and modify this Target Compound List (TCL) as compounds drop below their detection limits during the remediation process. Safety-

Kleen will not eliminate compounds from the TCL without prior consultation and approval from IEPA.

6.2 Sampling Frequency

In order to monitor the effectiveness and progress of the treatment system, Safety-Kleen proposed the following sampling schedule:

1. For the first three months, monthly soil samples will be obtained to establish actual extraction rates. These data will be useful in estimating the probable duration of the remediation. These data will also be useful in assessing the need for any additional bioremediation (see Section 5.4).

2. After the first three months, Safety-Kleen will begin a quarterly (four times per year) sampling and analysis program.

3. The soil treatment system effluent will also be monitored with an organic vapor analyzer during sampling visits.

6.2.1 Recordkeeping/Reporting

Results will be reported by letter to the IEPA as soon as possible after receipt of analytical results. This letter will include a tabulated summary of all detected compounds and their concentrations. The original laboratory reports will be maintained in a file at the Chicago Recycle Center. Copies of the original laboratory reports will be made available to the IEPA if requested.

In addition to reporting analytical results, these letters will also provide a report of the system status to the IEPA. Any proposed system changes, system progress (percent of compounds removed), and downtime for maintenance will be reported in these status reports. During the initial quarter (three months), these reports will be submitted monthly and then will be submitted on a quarterly basis thereafter.

The final status report will document the clean soils and detail the dismantling/removal and disposal of the temporary treatment cell structure.

7.0 OPERATION AND MAINTENANCE

Where possible, the operation and maintenance of the SVES will be integrated into the Chicago Recycle Center regular program of inspections and maintenance. These inspections will be divided into daily, weekly, and monthly inspections.

7.1 Daily Inspections

The system will be inspected daily to ensure that the vacuum blower is operating correctly. The dike embankment will be inspected for integrity and the temporary building will be inspected.

The daily inspection after rainstorms should also ensure that stormwater has not accumulated within the containment cell. Accumulations of any stormwater will be pumped out of the containment cell and treated as part of the normal site wastewater stream.

Any problems noted during the inspection should be recorded in an inspection log, and provisions should be made to rectify the problem as soon as possible. Any problem that results in the system being turned off will be logged and the amount of downtime reported in the next status report to IEPA.

7.2 Weekly Inspections

The weekly inspection is a more extensive daily inspection and will always include (in addition to the daily inspection items) an examination of the interior of the treatment cell. This examination should include an inspection of the impermeable liner that lines the containment cell walls to ensure its integrity. This inspection should also note the condition of the soil being treated. If it becomes noticeably compacted, arrangements should be made to till the soil to break up the soil particles and ensure good air flow through the soil.

7.3 Monthly Inspections

Monthly inspections will include all items addressed by the daily and weekly inspections and will also include tilling of the soil over the air extraction pipes.

A rototill machine may be used if necessary to till the soil around the air extraction pipes. Care must be taken to ensure the tilling machine does not damage the PVC pipes. After tilling, the soil will be redistributed in even piles over the air extraction pipes.

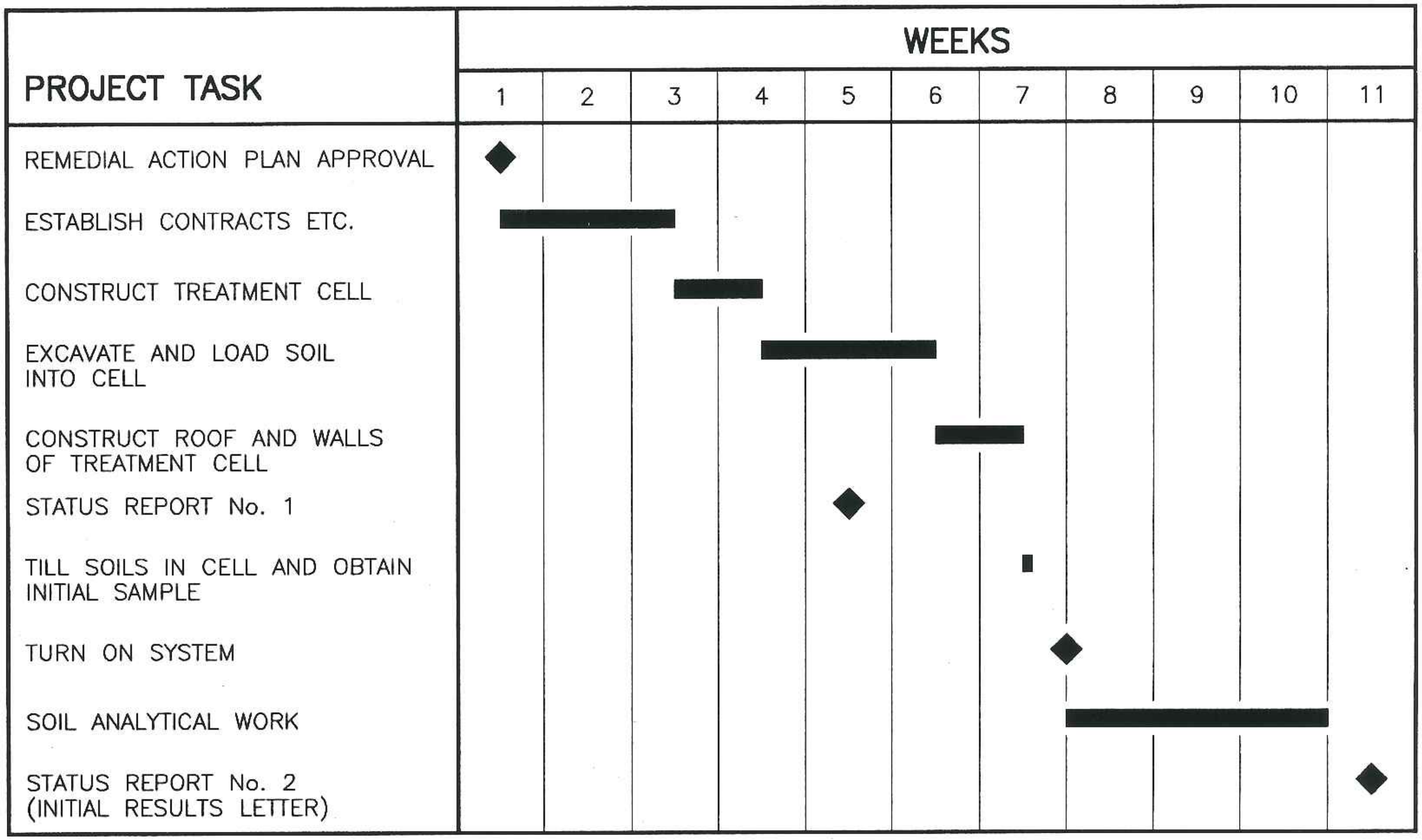
Any routine maintenance required by the vacuum blower, rototill tool, and other mechanical devices will be included in the monthly inspection schedule. All maintenance will be carried out per the various equipment manufacturer's instructions.

8.0 SCHEDULE OF IMPLEMENTATION

The following bar chart indicates the action items and schedule for the initial setup of the treatment system. Setup is anticipated to take approximately two-and-one-half months, and a status report is scheduled for the end of each month until the system is completely installed.

Project approval to completion of the treatment cell loaded with soil is expected to take one-and-one-half months (approximately six weeks). The first status report will be distributed one month after approval and include an overview of actions performed to date and a schedule for completion of remaining tasks.

The second status report will include the results of the baseline analytical results and will begin the first three months of monitoring. The schedule has not been extended past the first status report because the ultimate length of the project schedule is dependent upon the actual efficiency of the treatment system.



LEGEND:

◆ MILESTONE

REMEDIATION PROJECT SCHEDULE
PROJECT INITIATION
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY–KLEEN CORP.

Canonie Environmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-7-91	ISSUED TO CLIENT AND AGENCY	SAK	TJA	PWL

DATE: 12–7–91
SCALE: AS SHOWN

DRAWING NUMBER 90–280–A12

1

9.0 HEALTH AND SAFETY

The following health and safety procedures will be followed during the construction and operation of the treatment system. A complete health and safety plan can be found in Appendix A of the Sampling and Analysis Plan. All workers on this project will have had the appropriate training as required under 29 Code of Federal Regulations 1910.120.

1. A direct-reading organic vapor detection instrument will be used to monitor the concentration of VOCs in the ambient air whenever personnel are conducting work activities on the soil pile or under the protective covering. Appropriate respiratory protective equipment will be used, based on the concentration levels.

2. All personnel conducting intrusive work will wear safety glasses, steel-toed work boots, and a hard hat, at a minimum. Chemical-resistant rubber gloves, boots, and Tyvek® coveralls will be worn if conditions warrant their use.

3. A decontamination area will be set up near the soil pile. All personnel coming in contact with the soil will pass through the decontamination zone. It is anticipated that decontamination will include a boot wash only.

4. Equipment coming in contact with the soil will be decontaminated by water washing inside the treatment facility.

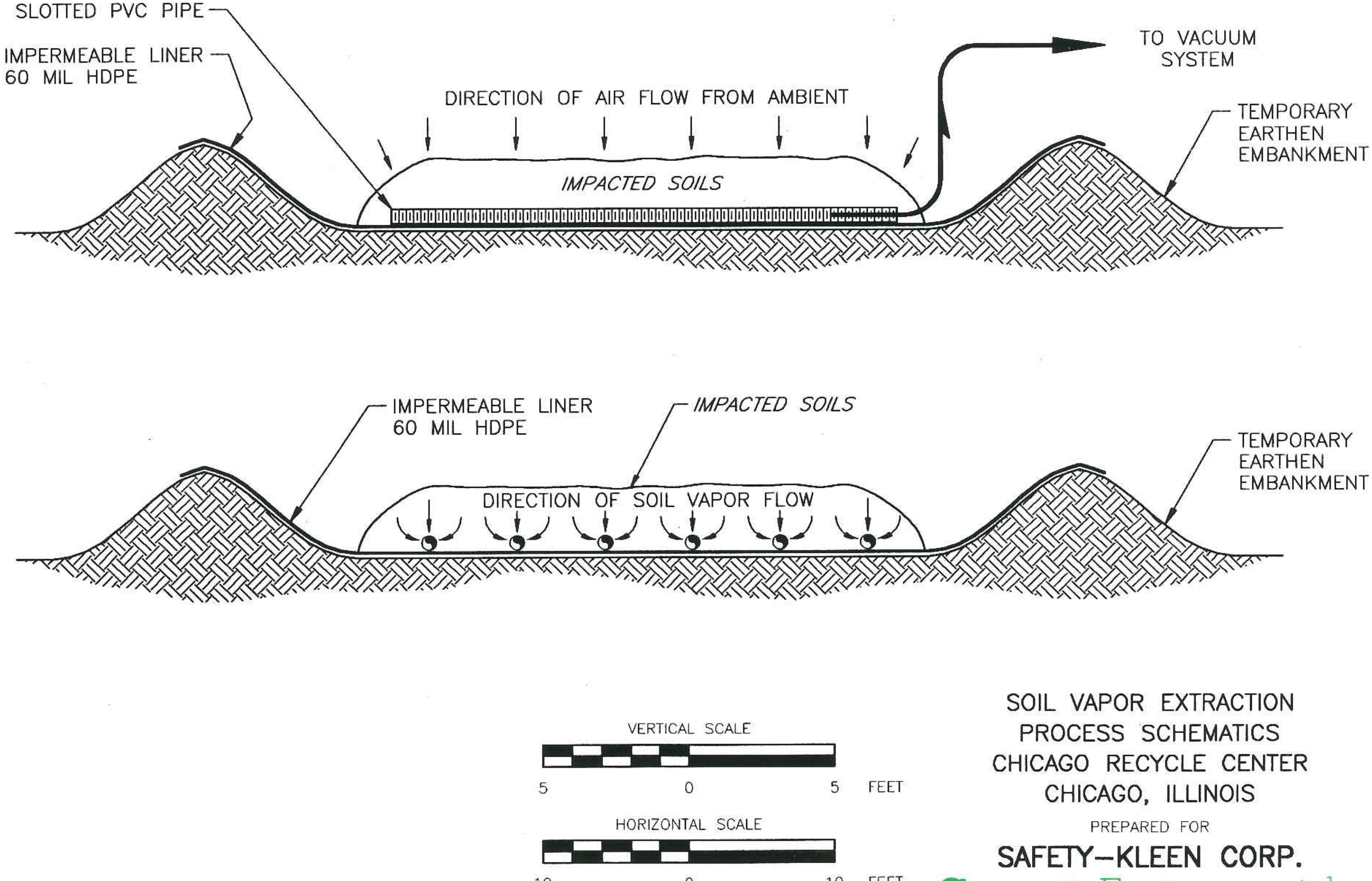
10.0 DEMOBILIZATION

At the completion of the soil treatment operation, Canonie will complete the following activities:

1. Disassemble and remove all process equipment and piping;

2. Disassemble and remove the protective overhead cover;

3. Perform a general site cleanup.



DRAWING NUMBER 90-280-A10

SOIL VAPOR EXTRACTION
PROCESS SCHEMATICS
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY-KLEEN CORP.

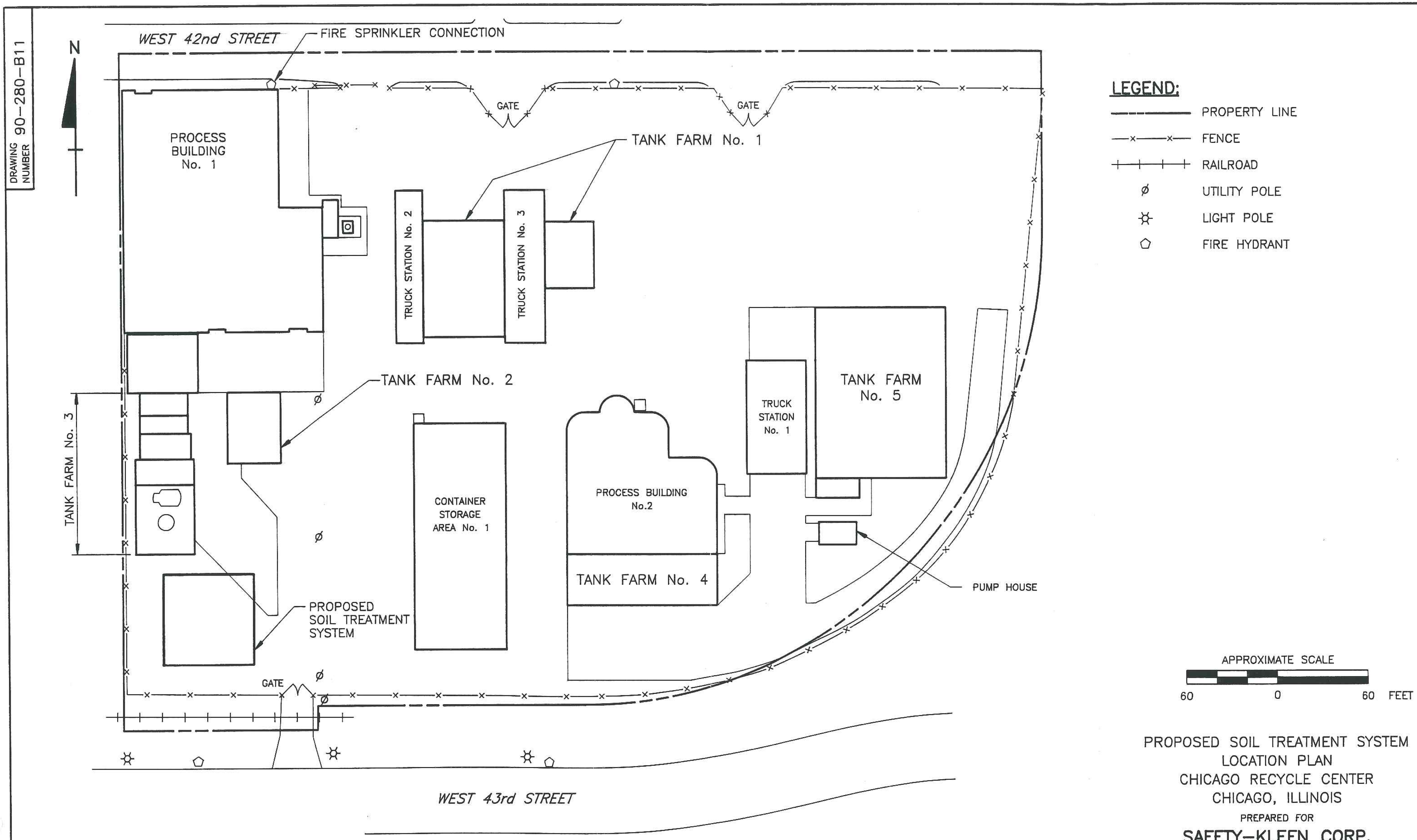
CanonieEnvironmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-7-91	ISSUED TO CLIENT AND AGENCY	SAK	TJA	PWL

DATE: 12-7-91
SCALE: AS SHOWN

FIGURE 1

DRAWING NUMBER 90-280-A10



PROPOSED SOIL TREATMENT SYSTEM
LOCATION PLAN
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY-KLEEN CORP.

CanonieEnvironmental

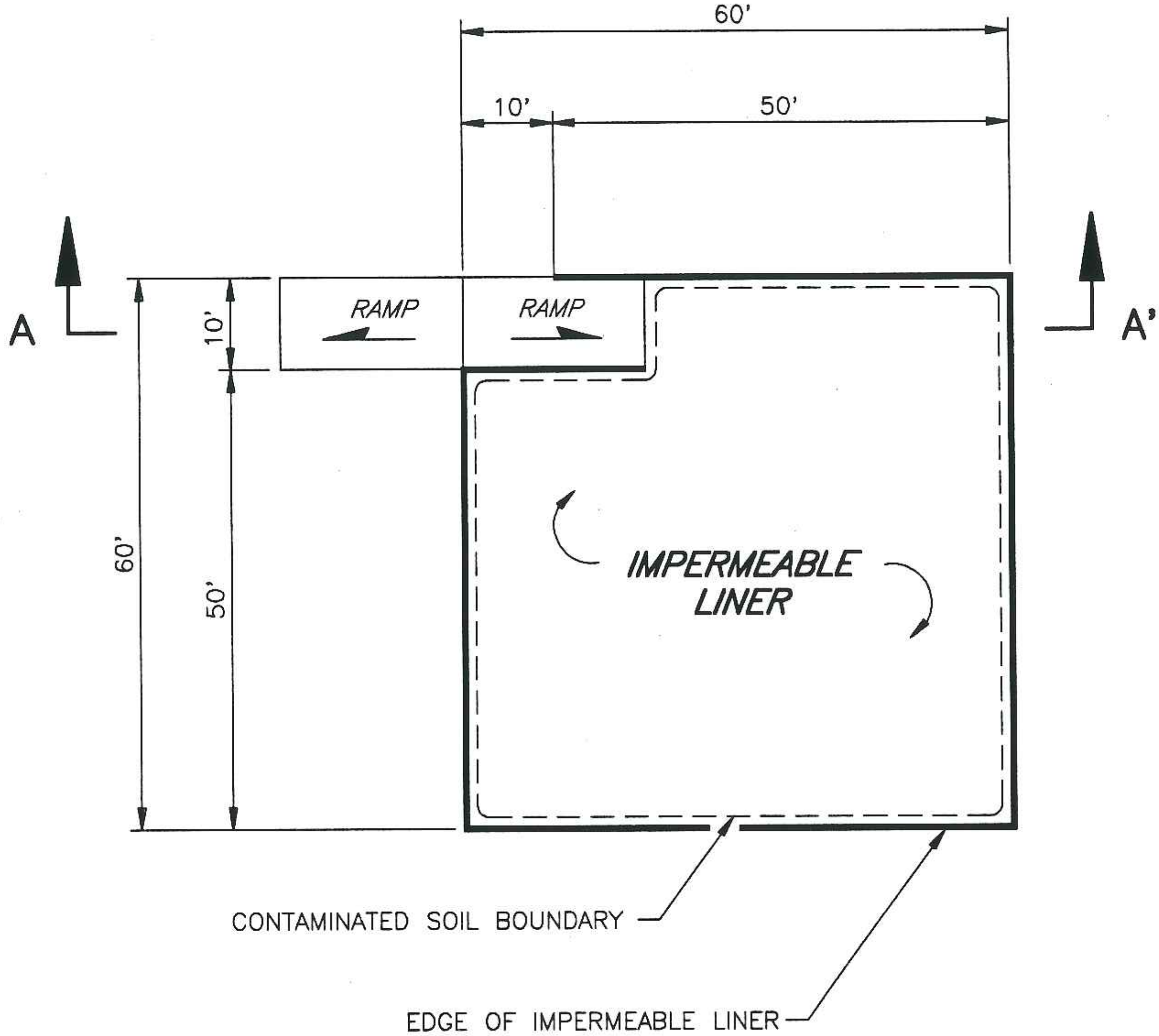
DATE: 12-7-91	FIGURE 2	DRAWING NUMBER 90-280-B11
SCALE: AS SHOWN		

REFERENCES:
- SAFETY KLEEN CORP., ELGIN ILLINOIS, DRAWING 88-62000-00, DATED 1987 REVISION 0.

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-7-91	ISSUED TO CLIENT AND AGENCY	SAK	[illegible]	PWL

1

DRAWING NUMBER 90-280-A7



NOTES:

1. SEE DWG. 90-280-A8 FOR SECTION A-A'.

TREATMENT CELL
PLAN
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY-KLEEN CORP.

Canonie Environmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
2	12-7-91	ISSUED TO CLIENT AND AGENCY	GWB	TA	PWL
1	12-5-91	ISSUED TO CLIENT	DRE	MJG	

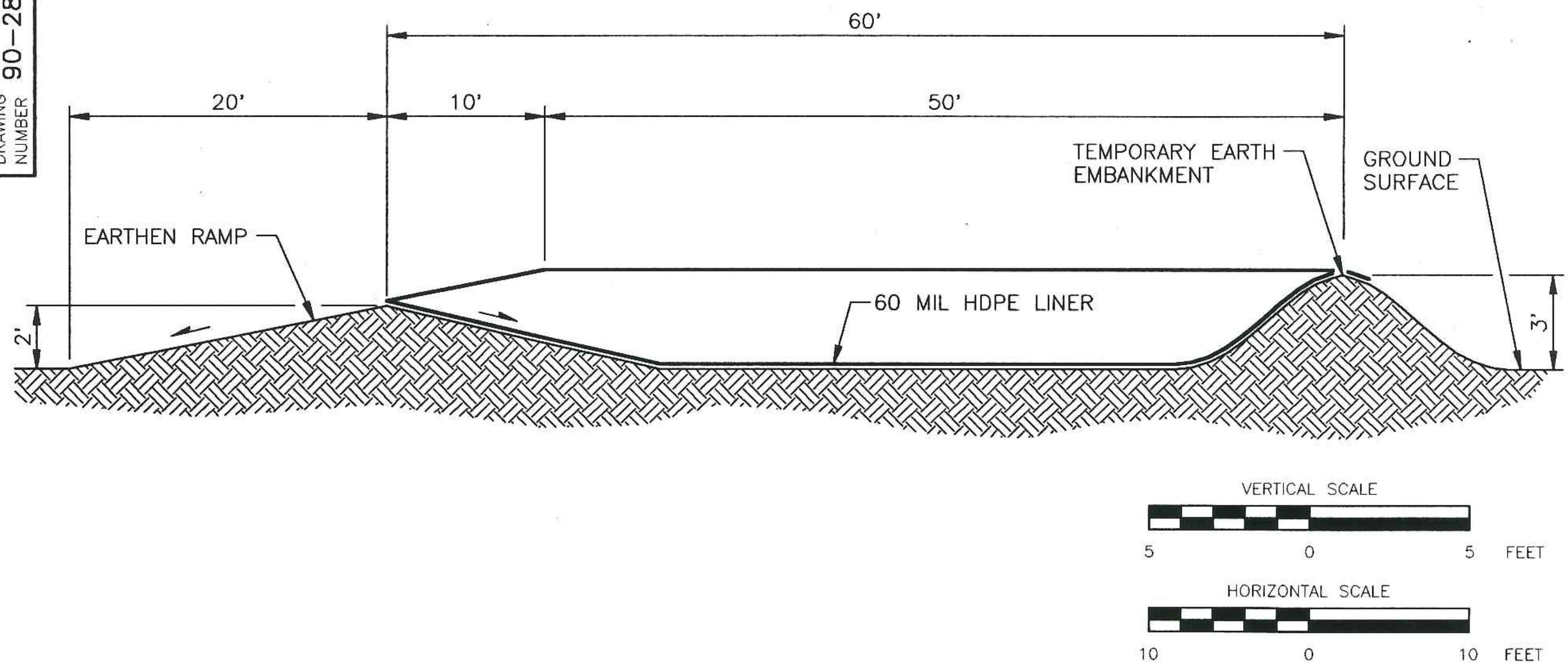
DATE: 12-5-91
SCALE: AS SHOWN

FIGURE 3

DRAWING NUMBER 90-280-A7

2

DRAWING NUMBER 90-280-A8



NOTES:

1. SEE DWG. 90-280-A7 FOR LOCATION OF SECTION A-A'.

TREATMENT CELL
SECTION A-A'
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY-KLEEN CORP.

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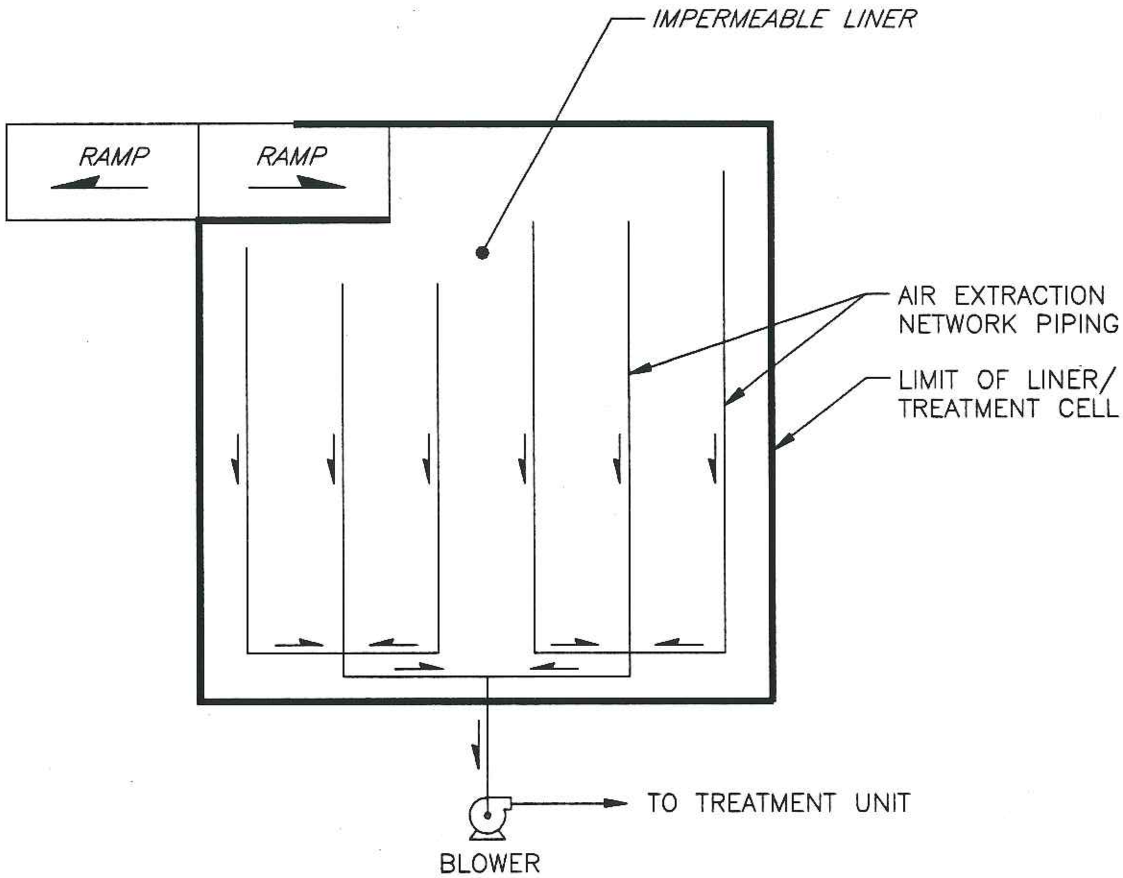
No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
2	12-7-91	ISSUED TO CLIENT AND AGENCY	GWB	JA	PWL
1	12-5-91	ISSUED TO CLIENT	DRE	MJG	

DATE: 12-5-91 SCALE: AS SHOWN	FIGURE 4	DRAWING NUMBER 90-280-A8

2

DRAWING NUMBER 90-280-A9



LEGEND:

→ DIRECTION OF FLOW

SCALE

20 0 20 FEET

SOIL TREATMENT SYSTEM
PROCESS FLOW DIAGRAM
CHICAGO RECYCLE CENTER
CHICAGO, ILLINOIS

PREPARED FOR

SAFETY-KLEEN CORP.

CanonieEnvironmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
2	12-7-91	ISSUED TO CLIENT AND AGENCY	GWB	[illegible]	[illegible]
1	12-5-91	ISSUED TO CLIENT	DRE	MJG	

DATE: 12-5-91
SCALE: AS SHOWN

FIGURE 5

DRAWING NUMBER 90-280-A9

2

RMT INC.

RMT, Inc.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444
FAX: 608-831-3334

June 11, 1991

RECEIVED
JUN 13 1991
EHS Dept. - Remediation
SAFETY-KLEEN CORP.

Mr. Scott Davies
Senior Project Manager - Remediation
Safety-Kleen Corporation
777 Big Timber Road
Elgin, IL 60123

RE: Results of VOC analyses on ground water samples from Safety-Kleen Chicago Recycle Center

Dear Scott:

This letter summarizes the results of RMT's chemical analyses on the ground water samples collected from the study area near Tank Farm No. 3 at Safety-Kleen's Chicago Recycle Center (Figure 1). The laboratory data sheets are included as Attachment A.

RESULTS OF CHEMICAL ANALYSES

The ground water samples were collected using the methods described in our May 1991 letter to you, and were analyzed at RMT Analytical Laboratories using EPA Method 8010/8020. The results of the analyses are summarized in Table 1. The laboratory gas chromatograph (GC) analyses of ground water generally support the results of the headspace analyses with the portable GC reported in our May 1991 letter. Levels of toluene (470,000 µg/L) were observed in sample P-1, collected within the diked area of Tank Farm No. 3, as well as methylene chloride (9,500 µg/L) and chloroform (50,000 µg/L). Outside the Tank Farm, there were no significant toluene detects, and methylene chloride and chloroform were detected at relatively low levels.

The chromatogram from the analysis of sample P-2, collected immediately south of Tank Farm No. 3, showed a large unknown peak between the retention times for chloroform and 1,2-dichloroethylene. No other compounds were identified during the analysis. Identification of this peak may be possible using a gas chromatograph/mass spectrometer (GC/MS) method (e.g., EPA Method 8240).

The samples from well points P-3 and P-4 contained low levels of various chlorinated compounds, but contained no toluene and showed only minor concentrations of methylene chloride and chloroform. Consequently, the release at the Tank Farm does not appear to be the principal source of the VOCs detected to the south and southeast of the Tank Farm, based on the dissimilarities among chemical species and concentrations present in the ground water samples from within the Tank Farm (P-1) and well points P-2, P-3, and P-4.

Table 1 includes the observed concentrations in ground water samples from the site and the proposed Sample Action Levels (SALs) from the Proposed RCRA Corrective Action Rule for Solid Waste Management Units at Hazardous Waste Management Facilities (Federal Register, July 27,

2251.01 0000:MSG:davies.2

1990). The VOCs in well P-1 exceed the proposed SALs for methylene chloride and chloroform by 3 to 4 orders of magnitude, and for toluene by a factor of 50. The VOCs in well point P-4 exceed the proposed SALs for methylene chloride and trichloroethylene by factors of 2 and 6, respectively.

If we can be of any further assistance to you in this matter, please call.

Sincerely,

GENE FMS

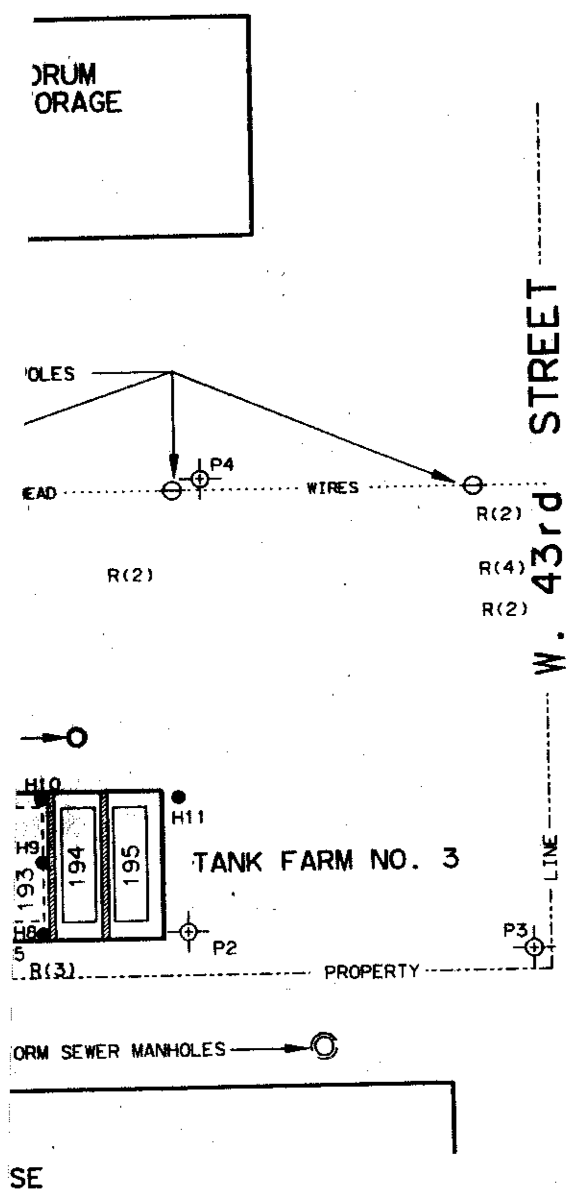
Eugene L. McLinn
Hydrogeologist

FRED

Frederick M. Swed, Jr., P.E.
Project Manager

mp

Attachments



SITE SKETCH

SAFETY KLEEN
CHIGAGO RECYCLE CENTER
CHICAGO, ILLINOIS

NOTES

1) SITE SKETCH BASED ON EXISTING CONDITIONS OBSERVED DURING RMT FIELD INVESTIGATION IN MAY 1991

2) LOCATIONS OF ALL STRUCTURES AND SAMPLING POINTS ARE APPROXIMATE.

3) TANKS 190, 191, 192, AND 193 WERE REMOVED IN MAY 1991.

LEGEND

P1	WELL POINT
H10	SOIL SAMPLE LOCATION
R(3)	REFUSAL (NUMBER OF ATTEMPTS)
191	TANK LOCATION
	TELEPHONE (POLE)
	SEWER (MANHOLES)
	SUMP
	PROPERTY LINE

SCALE: 1" = 50'

RMT INC.

DWN. BY:	RJB
DATE:	MAY 1991
PROJ. NO.	2251.01
FILE NO.	22510101

JUN 10 1991

FIGURE 1

TABLE 1

VOC CONCENTRATIONS IN GROUND WATER SAMPLES

Sample Location[1]	Concentration (µg/L)								
	MC[3]	CF[3]	TOL[3]	CE[3]	1,1-DCA[3]	1,2-DCE[3]	TCE[3]	1,1,1-TCA[3]	PCE[3]
P-1	9,500	50,000	470,000	< 10,000	< 5,000	< 5,000	< 10,000	< 10,000	< 10,000
P-2[2]	< 500	< 500	< 500	< 1,000	< 500	< 500	< 1,000	< 1,000	< 1,000
P-3	1.9	1.1	< 1.0	4.4	23	4.8	3.2	< 2.0	< 2.0
P-4	12	< 10	< 10	24	96	21	28	29	< 20
Proposed RCRA SALs[3]	5	6	10,000	NA	NA	NA	5	3,000	0.7

NOTES:

1 Sample locations are shown on Figure 1.

2 Detection levels elevated because of large unknown peak during sample elution.

3 MC = methylene chloride
CF = chloroform
TOL = toluene
CE = chloroethane
1,1-DCA = 1,1-dichloroethane
1,2-DCE = 1,2-dichloroethylene
TCE = trichloroethylene
1,1,1-TCA = 1,1,1-trichloroethane
PCE = perchloroethylene
SALs = Suggested Action Levels
NA = Not available

ATTACHMENT A

RMT® LABORATORIES

CLIENT: SAFETY KLEEN
SAMPLE #: 66511
PROJECT #: 02251.01
WORK ORDER #: 910510-0225101

REPORT DATE: 05/30/91
COLLECTION DATE: 05/09/91
STATION ID: P1
SAMPLE COLLECTOR: ELM

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 8010 & 8020

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<10000	ug/1
BROMOMETHANE	<10000	ug/1
VINYL CHLORIDE	<5000	ug/1
DICHLORODIFLUOROMETHANE	<10000	ug/1
CHLOROETHANE	<10000	ug/1
METHYLENE CHLORIDE	9500	ug/1
FLUOROTRICHLOROMETHANE	<10000	ug/1
1,1-DICHLOROETHYLENE	<5000	ug/1
1,1-DICHLOROETHANE	<5000	ug/1
1,2-DICHLOROETHYLENE (TOTAL)	<5000	ug/1
CHLOROFORM	50000	ug/1
1,2-DICHLOROETHANE	<5000	ug/1
1,1,1-TRICHLOROETHANE	<10000	ug/1
CARBON TETRACHLORIDE	<5000	ug/1
BROMODICHLOROMETHANE	<5000	ug/1
1,2-DICHLOROPROPANE	<5000	ug/1
CIS-1,3-DICHLOROPROPYLENE	<10000	ug/1
TRICHLOROETHYLENE	<10000	ug/1
BENZENE	<5000	ug/1
1,1,2-TRICHLOROETHANE	<5000	ug/1
TRANS-1,3-DICHLOROPROPYLENE	<10000	ug/1
CHLORODIBROMOMETHANE	<5000	ug/1
2-CHLOROETHYLVINYL ETHER	<25000	ug/1
BROMOFORM	<5000	ug/1
TETRACHLOROETHYLENE	<10000	ug/1
1,1,2,2-TETRACHLOROETHANE	<10000	ug/1
TOLUENE	470000	ug/1
CHLOROBENZENE	<5000	ug/1
ETHYLBENZENE	<5000	ug/1
XYLENES	<15000	ug/1
1,3-DICHLOROBENZENE	<5000	ug/1
1,2-DICHLOROBENZENE	<5000	ug/1
1,4-DICHLOROBENZENE	<5000	ug/1

Mark A. Mieritz

Mark Mieritz, Organic Supervisor

744 Heartland Trail, P.O. Box 8923, Madison, WI 53708-8923, Ph:(608)831-4444

RMT
LABORATORIES

CLIENT: SAFETY KLEEN
SAMPLE #: 66512
PROJECT #: 02251.01
WORK ORDER #: 910510-0225101

REPORT DATE: 05/30/91
COLLECTION DATE: 05/09/91
STATION ID: P2
SAMPLE COLLECTOR: ELM

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 8010 & 8020

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<1000L	ug/1
BROMOMETHANE	<1000L	ug/1
VINYL CHLORIDE	<500L	ug/1
DICHLORODIFLUOROMETHANE	<1000L	ug/1
CHLOROETHANE	<1000L	ug/1
METHYLENE CHLORIDE	<500L	ug/1
FLUOROTRICHLOROMETHANE	<1000L	ug/1
1,1-DICHLOROETHYLENE	<500L	ug/1
1,1-DICHLOROETHANE	<500L	ug/1
1,2-DICHLOROETHYLENE (TOTAL)	<500L	ug/1
CHLOROFORM	<500L	ug/1
1,2-DICHLOROETHANE	<500L	ug/1
1,1,1-TRICHLOROETHANE	<1000L	ug/1
CARBON TETRACHLORIDE	<500L	ug/1
BROMODICHLOROMETHANE	<500L	ug/1
1,2-DICHLOROPROPANE	<500L	ug/1
CIS-1,3-DICHLOROPROPYLENE	<1000L	ug/1
TRICHLOROETHYLENE	<1000L	ug/1
BENZENE	<500L	ug/1
1,1,2-TRICHLOROETHANE	<500L	ug/1
TRANS-1,3-DICHLOROPROPYLENE	<1000L	ug/1
CHLORODIBROMOMETHANE	<500L	ug/1
2-CHLOROETHYLVINYL ETHER	<2500L	ug/1
BROMOFORM	<500L	ug/1
TETRACHLOROETHYLENE	<1000L	ug/1
1,1,2,2-TETRACHLOROETHANE	<1000L	ug/1
TOLUENE	<500L	ug/1
CHLOROBENZENE	<500L	ug/1
ETHYLBENZENE	<500L	ug/1
XYLENES	<1500L	ug/1
1,3-DICHLOROBENZENE	<500L	ug/1
1,2-DICHLOROBENZENE	<500L	ug/1
1,4-DICHLOROBENZENE	<500L	ug/1

Mark A. Mieritz

Mark Mieritz, Organic Supervisor

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RMT LABORATORIES

CLIENT: SAFETY KLEEN
SAMPLE #: 66513
PROJECT #: 02251.01
WORK ORDER #: 910510-0225101

REPORT DATE: 05/30/91
COLLECTION DATE: 05/09/91
STATION ID: P3
SAMPLE COLLECTOR: ELM

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 8010 & 8020

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<2.0	ug/1
BROMOMETHANE	<2.0	ug/1
VINYL CHLORIDE	<1.0	ug/1
DICHLORODIFLUOROMETHANE	<2.0	ug/1
CHLOROETHANE	4.4	ug/1
METHYLENE CHLORIDE	1.9	ug/1
FLUOROTRICHLOROMETHANE	<2.0	ug/1
1,1-DICHLOROETHYLENE	<1.0	ug/1
1,1-DICHLOROETHANE	23	ug/1
1,2-DICHLOROETHYLENE (TOTAL)	4.8	ug/1
CHLOROFORM	1.1	ug/1
1,2-DICHLOROETHANE	<1.0	ug/1
1,1,1-TRICHLOROETHANE	<2.0	ug/1
CARBON TETRACHLORIDE	<1.0	ug/1
BROMODICHLOROMETHANE	<1.0	ug/1
1,2-DICHLOROPROPANE	<1.0	ug/1
CIS-1,3-DICHLOROPROPYLENE	<2.0	ug/1
TRICHLOROETHYLENE	3.2	ug/1
BENZENE	<1.0	ug/1
1,1,2-TRICHLOROETHANE	<1.0	ug/1
TRANS-1,3-DICHLOROPROPYLENE	<2.0	ug/1
CHLORODIBROMOMETHANE	<1.0	ug/1
2-CHLOROETHYLVINYL ETHER	<5.0	ug/1
BROMOFORM	<1.0	ug/1
TETRACHLOROETHYLENE	<2.0	ug/1
1,1,2,2-TETRACHLOROETHANE	<2.0	ug/1
TOLUENE	<1.0	ug/1
CHLOROBENZENE	<1.0	ug/1
ETHYLBENZENE	<1.0	ug/1
XYLENES	<3.0	ug/1
1,3-DICHLOROBENZENE	<1.0	ug/1
1,2-DICHLOROBENZENE	<1.0	ug/1
1,4-DICHLOROBENZENE	<1.0	ug/1

Mark G. Mieritz

Mark Mieritz, Organic Supervisor

744 Heartland Trail, P.O. Box 8923, Madison, WI 53708-8923, Ph:(608)831-4444

RMT INC. LABORATORIES

CLIENT: SAFETY KLEEN
SAMPLE #: 66514
PROJECT #: 02251.01
WORK ORDER #: 910510-0225101

REPORT DATE: 05/30/91
COLLECTION DATE: 05/09/91
STATION ID: P4
SAMPLE COLLECTOR: ELM

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 8010 & 8020

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<20	ug/1
BROMOMETHANE	<20	ug/1
VINYL CHLORIDE	<10	ug/1
DICHLORODIFLUOROMETHANE	<20	ug/1
CHLOROETHANE	24	ug/1
METHYLENE CHLORIDE	12	ug/1
FLUOROTRICHLOROMETHANE	<20	ug/1
1,1-DICHLOROETHYLENE	<10	ug/1
1,1-DICHLOROETHANE	96	ug/1
1,2-DICHLOROETHYLENE (TOTAL)	21	ug/1
CHLOROFORM	<10	ug/1
1,2-DICHLOROETHANE	<10	ug/1
1,1,1-TRICHLOROETHANE	29	ug/1
CARBON TETRACHLORIDE	<10	ug/1
BROMODICHLOROMETHANE	<10	ug/1
1,2-DICHLOROPROPANE	<10	ug/1
CIS-1,3-DICHLOROPROPYLENE	<20	ug/1
TRICHLOROETHYLENE	28	ug/1
BENZENE	<10	ug/1
1,1,2-TRICHLOROETHANE	<10	ug/1
TRANS-1,3-DICHLOROPROPYLENE	<20	ug/1
CHLORODIBROMOMETHANE	<10	ug/1
2-CHLOROETHYLVINYL ETHER	<50	ug/1
BROMOFORM	<10	ug/1
TETRACHLOROETHYLENE	<20	ug/1
1,1,2,2-TETRACHLOROETHANE	<20	ug/1
TOLUENE	<10	ug/1
CHLOROBENZENE	<10	ug/1
ETHYLBENZENE	<10	ug/1
XYLENES	<30	ug/1
1,3-DICHLOROBENZENE	<10	ug/1
1,2-DICHLOROBENZENE	<10	ug/1
1,4-DICHLOROBENZENE	<10	ug/1

Mark A. Mieritz

Mark Mieritz, Organic Supervisor

/

QUALIFIERS

B= Analyte is present in the blank as well as the sample.

E= Analyte exceeds calibration range, but is within linear range.

Hn= Sample analysis was past hold time by n number of days.

I= Detection limit raised due to interfering endogenous peak(s).

L= Sample could not be run at a lower dilution because of high levels of unrequested compound(s).

F= Sample had repeated surrogate failure.

R= Slight retention time variance between sample and standard. Analyte cannot be confirmed by this method.

V= Insufficient sample volume prohibited sample re-analysis.

N= RPD high due to non-homogeneity of sample.

C= Detection limit raised due to co-elution.

S= Sampled with significant headspace.

RMT INC.

RMT, Inc.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444
FAX: 608-831-3334

RECEIVED
MAY 29 1991
EHS Dept. - Remediation
SAFETY-KLEEN CORP.

May 24, 1991

Mr. Scott Davies
Sr. Project Manager-Remediation
Safety Kleen
777 Big Timber Road
Elgin, IL 60123

RE: Soil Vapor Survey at the Safety Kleen Chicago Recycle Facility

Dear Scott:

This letter summarizes the results of RMT's soil gas survey and limited subsurface investigation of the area near Tank Farm No. 3 at Safety Kleen's Chicago Recycle facility.

SCOPE OF INVESTIGATION

RMT performed an on-site investigation during the period from May 7 to May 9, 1991. The study was conducted at Safety Kleen's request. The results of this investigation will be used to prepare an amended closure plan designed to more fully evaluate the extent of the subsurface impacts related to the Tank Farm No. 3 area. The study area is shown on Figure 1 and lies within the southwest corner of the Safety Kleen Chicago Recycle facility. The northwest corner of the study area corresponds to the northwest corner of Tank Farm No. 3, and the southeast corner was the power line pole at the southern property boundary. Soil samples were collected from the shallow subsurface using hand tools, and soil headspace was analyzed in the field with a portable gas chromatograph.

Soil samples were collected at 15 locations, including Tank Farm No. 3 and the area to the south and southeast, as shown on Figure 1. No samples were collected north or west of the tank farm because of the thickness and hardness of the fill material, and/or general inaccessibility due to site features. The thickness of concrete in numerous locations rendered coring attempts ineffective. Refusal in fill was also encountered above the water table at five locations at the site.

RMT installed four well points based on the results of the soil headspace analyses and collected ground water samples for volatile organic chemical (VOC) analysis using EPA Method 8010/8020. The results of the ground water analyses will be submitted to Safety Kleen in a subsequent letter report.

SUBSURFACE CONDITIONS

Subsurface exploration at the site was complicated by the thickness of concrete pavement and the presence of rubble and fill from former buildings and roads buried beneath the existing land surface. Subsurface conditions observed during this investigation were consistent with the results of

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foundation borings installed during construction of the new Safety Kleen office building, north of 42nd Street, and of previous excavations at the Chicago Recycle facility to the west of the study area, according to the plant manager.

Soil samples were collected with a soil probe, post-hole digger, pickax, and split-spoon sampler. Concrete was penetrated at several locations using a rotary hammer. Sample locations are indicated on Figure 1.

The fill encountered at the site was between 2 and 3.5 feet thick. The fill consisted of bricks, concrete slabs, granite paving stones, and dolomite flagstones. To the east of Tank Farm 3, several layers of concrete slabs and bricks were exposed with a minimum thickness of 2.5 feet. Granular fill, consisting of fine to coarse sand and some fine gravel, was encountered during exploration inside the tank farm. The fill was underlain throughout the site by clayey silt to clay that was brownish gray to black, soft, plastic, and wet. The clay and silt belong to the Carmi Member of the Equality Formation (Willman and Lineback, 1970).

The area around Tank Farm No. 3 was surrounded by poured concrete dikes that extended 5 feet above grade and 4 feet below grade, according to the plant manager. The above-grade portion of most of the dikes were removed by Canonie Environmental, Inc. (Canonie), but the subsurface portion of the dikes were left in place. Canonie was demolishing the dikes when RMT was on-site. The area contained by the dikes for Tank Farm No. 3 is mostly unpaved, and the rest of the site is discontinuously paved.

SOIL GAS ANALYSIS

Soil samples were collected from the split-spoon, auger, or soil sampler, and were placed in 40-mL VOA vials with Teflon®-coated septa caps. The vials were filled approximately half full of soil. VOCs in the soil were allowed to equilibrate with the overlying air in the VOA vial (the headspace) for approximately 30 minutes or more. The headspace was sampled with a gas-tight syringe, and then was injected into a Photovac 10S50 portable gas chromatograph (GC) for analysis. Based on previous sampling results at the facility, the GC was calibrated for toluene, trichloroethene (TCE), and tetrachloroethene (PCE) using freshly prepared gas standards at the start of the project. Standards were run several times daily for retention time calibration. Replicate samples were run on every sample location, and duplicate injections were made for each sample. In addition, regular checks were made for syringe and empty vial contamination.

SOIL GAS RESULTS

Results of the soil gas analysis are presented in Table 1. The results are presented as µL/L, or parts per million by volume (ppmv) of gas in this headspace over the soil sample. PPMV is a different unit of measure than part per million by weight (mg/kg), as used in laboratory analysis of soil, The two measurements are not directly comparable, because of the potential for complex partitioning of a compound into the dissolved, gaseous, or sorbed phases.

The results indicate that some, but not all, of the soil samples inside the concrete wall surrounding the tank area have elevated concentrations of toluene and TCE, with much lower concentrations of PCE. These results are generally consistent with the previous analysis of the soil by Canonie. Two soil headspace locations, H-6 and H-8, were adjacent to sampling location S-4 and S-1, respectively, from which samples had been collected and analyzed previously by Canonie. For comparison, RMT's soil headspace and Canonie's compositional analysis are presented in Table 2.

The headspace analysis is in approximate agreement with compositional analysis. For sample S-4/H-6, toluene was the major component identified in both analyses, with lower concentrations of TCE and much lower levels of PCE. Both compositional analysis and headspace analysis showed low levels for the three VOCs in sample S-1/H-8. Both the headspace analysis and compositional analysis also showed that the shallow samples had lower concentrations of toluene and TCE than did the deeper samples. The deeper samples were collected from below the water table.

Samples outside of the Tank Farm No. 3 area also had detectable concentrations of toluene or TCE in the soil headspace. Sample H-5, just to the west of the enclosure wall, had measurable concentrations of both toluene and TCE. The samples to the south of the retaining wall around tank 195 (P-2 deep and H-11 deep) had detectable levels of toluene. Sample P-3, at the southwest corner of the property, had detectable concentrations of toluene and TCE in one of the two replicate samples; the other sample had no detectable concentrations. Sample P-4, near the telephone pole east of tank 195, also had detectable levels of toluene in the headspace.

The results suggest that the soil within the Tank Farm has elevated levels of toluene and TCE, and that lower levels of toluene were detected in samples outside of the enclosed area.

HYDROGEOLOGY

Four well points, consisting of 3-foot-long stainless-steel screens and 3-foot-long galvanized iron risers, were installed with a slide hammer at locations of interest, based on the results of the soil headspace analysis with the portable GC. Well points were installed inside Tank Farm No. 3 (P-1), immediately south of the tank farm (P-2), at the southwestern corner of the site (P-3), and 100 feet east of the tank farm (P-4) as indicated on Figure 1.

The subsurface portion of the dikes extends through the fill to the underlying clay, based on soil samples collected from inside the tank farm. This likely restricts lateral ground water flow from the tank farm by forcing the water to flow through the clay instead of through the overlying granular fill and, as a result, may serve to contain chemical constituents within the diked area. The depth to water varied from 0.5 to 1 foot below grade within the tank farm dikes and from 2.5 to 3.5 feet below grade south of the tank farm. The water table was encountered in the granular fill within the diked area of the tank farm and in the underlying clay south of the tank farm. Because the ground surface within Tank Farm No. 3 is mostly unpaved and the subsurface portion of the dikes restrict lateral ground water flow, it is likely that enhanced recharge is occurring in this area, causing the formation of a ground water mound.

A storm sewer at the Ashland Cold Storage facility, approximately 25 feet west of Tank Farm 3, may influence shallow ground water flow locally, because the invert for the storm sewer or the associated backfill likely intersects the water table. No uncontrolled storm sewers exist at the Safety Kleen facility.

Ground water samples were collected with a PVC bailer from well points P-2, P-3, and P-4 after development. Well point P-1 was bent during installation, so the sample from location P-1 was collected by digging a hole next to the well and allowing it to fill with water. A sheen and solvent odors were detected on the surface of water in the holes for P-1 and P-2.

CONCLUSION

Based on the results of the analyses of soil headspace and the solvent odors associated with well points P-1 and P-2, solvents associated with Tank Farm No. 3 have affected soils and probably ground water. Additional information regarding ground water quality will be available upon receipt of the analytical data. A letter report summarizing this data will be submitted to Safety Kleen in the future.

We hope that this information and discussion are useful. Please call if you have any questions.

Sincerely,

Gene

Eugene L. McLinn
Hydrogeologist

FRED

Frederick M. Swed, Jr., P.E.
Project Manager

nsr

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TABLE 1

RESULTS OF SOIL HEADSPACE ANALYSIS, MAY 1991

Sample Location	Sample Depth (ft.)	Saturated/ Unsaturated	Soil Headspace Concentration μL/L (ppmv)		
Inside Tank Farm No.3			Toluene	TCE	PCE
P-1	1.5	S	2,700	25	BD
H-7	1.5	S	2,230	974	BD
H-6	1.5	S	2,480	510	BD
H-10	0.5	U	0.34	0.76	1.22
H-10	0.3	S	1,600	11,000	BD
H-9	1.5	S	380	7.5	BD
H-8	1.5	U	BD	BD	BD
Outside Tank Farm No.3					
H-5	2	U	4.2	7.2	BD
P-2	0.5	U	BD	0.21	BD
P-2	3.5	S	20.5	BD	BD
H-11	0.5	U	0.02	3.2	BD
H-11	3.5	S	7.85	0.05	BD
P-3	3.5	S	1.7	0.35	BD
P-4	3	S	5.12	BD	BD
P-4	4	S	0.65	BD	BD

NOTES: 1. TCE = trichloroethylene, PCE = perchloroethylene, BD = below detection limits, S = saturated, U = unsaturated

2. Soil headspace was analyzed in the field with a portable gas chromatograph.

TABLE 2

COMPARISON OF SOIL HEADSPACE AND COMPOSITIONAL ANALYSIS

Sample S-4/H-6	Toluene	TCE	PCE
Compositional Analysis, mg/kg	44,000	2,800	42
Headspace, µL/L	2,480	510	80
Sample S-1/H-8	**Toluene**	**TCE**	**PCE**
Compositional Analysis, mg/kg	0.012	0.92	< 0.005
Headspace, µL/L	BD	BD	BD

NOTES: 1. Soil samples S-4 and S-1 were collected by Canonie and analyzed for VOCs using EPA Method 8240 in February 1991. Samples H-6 and H-8 were collected by RMT and the soil headspace analyzed for Toluene, TCE, and PCE using a portable gas chromatograph in May 1991.

2. TCE = trichloroethylene, PCE = perchloroethylene, BD = below detection limit.

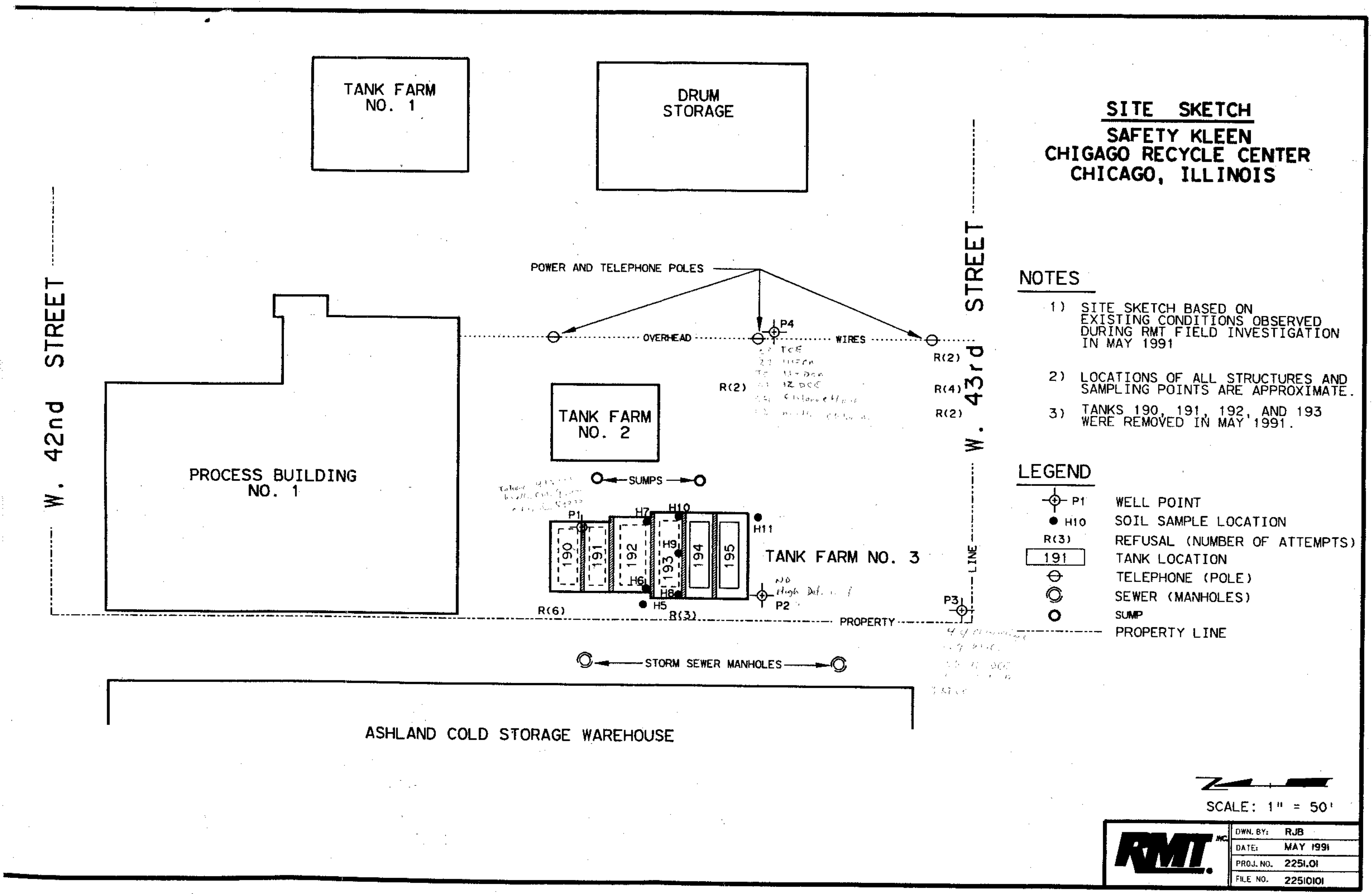
SITE SKETCH
SAFETY KLEEN
CHIGAGO RECYCLE CENTER
CHICAGO, ILLINOIS
NOTES
1) SITE SKETCH BASED ON EXISTING CONDITIONS OBSERVED DURING RMT FIELD INVESTIGATION IN MAY 1991
2) LOCATIONS OF ALL STRUCTURES AND SAMPLING POINTS ARE APPROXIMATE.
3) TANKS 190, 191, 192, AND 193 WERE REMOVED IN MAY 1991.
LEGEND
P1 WELL POINT
H10 SOIL SAMPLE LOCATION
R(3) REFUSAL (NUMBER OF ATTEMPTS)
191 TANK LOCATION
TELEPHONE (POLE)
SEWER (MANHOLES)
SUMP
PROPERTY LINE
TANK FARM NO. 1
DRUM STORAGE
W. 42nd STREET
W. 43rd STREET
POWER AND TELEPHONE POLES
OVERHEAD
WIRES
PROCESS BUILDING NO. 1
TANK FARM NO. 2
TANK FARM NO. 3
SUMPS
STORM SEWER MANHOLES
PROPERTY
LINE
ASHLAND COLD STORAGE WAREHOUSE
SCALE: 1" = 50'
RMT INC.
DWN. BY: RJB
DATE: MAY 1991
PROJ. NO. 2251.01
FILE NO. 22510101

FIGURE 1